Ruptured Intrasellar Superior Hypophyseal Artery Aneurysm Presenting with Pure Subdural Haematoma

Case Report

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Summary

Subdural haemorrhage from a ruptured intracranial aneurysm is a well-known entity when associated with subarachnoid haemorrhage. However, haemorrhage confined only to the subdural space is rare because there are limited anatomical sites where extravasation can be purely subdural. We report the rare case of a patient who suffered pure subdural haematoma after the rupture of a left superior hypophyseal artery aneurysm located within the sella turcica. The patient was treated with endovascular coil embolization of the aneurysm. Angiography immediately after treatment and one month later revealed complete obliteration of the aneurysm. Six months after treatment, the patient remained symptom free.

Introduction

The prompt diagnosis and treatment of a ruptured intracranial aneurysm is imperative. In patients presenting with subarachnoid haemorrhage (SAH), the diagnosis is relatively uncomplicated. Acute subdural haematoma is infrequently associated with SAH [1,2]. Pure subdural haemorrhage caused by aneurysmal rupture is exceedingly rare and may provide a challenge in diagnosis. We report the unusual case of a patient who suffered a ruptured intrasellar superior hypophyseal artery aneurysm with pure subdural haematoma.

Case Report

A 57-year-old, right-handed, Hispanic woman presented to the emergency room with complaints of severe occipital headache, neck pain, visual disturbance, nausea and vomiting. Her symptoms had arisen suddenly one week previously, while she was arguing with her family. Her headache was progressive, and she reported darkening of her vision and a red coloring of bright lights. She had no significant medical history. Neurological examination was unremarkable, but ophthalmological examination revealed markedly diminished visual acuity and retinal haemorrhage in both eyes.

A CT scan of the head showed no evidence of SAH. Lumbar puncture revealed clear cerebrospinal fluid. MR imaging showed a thin subdural haematoma layered over the skull base, which extended from the sella turcica along the middle cranial fossa and into the posterior fossa (figure 1). MR angiography demonstrated an internal carotid artery (ICA) aneurysm extending into the pituitary fossa. The patient underwent conventional catheter cerebral angiography that revealed a medially directed, bilobed superior hypophyseal artery aneurysm arising from the posterior medial aspect of the left ICA, distal to the ophthalmic artery origin (figure 2).

The patient underwent endovascular coil embolization of the aneurysm. Angiography immediately after treatment revealed near-complete obliteration of the aneurysm (figure 3).

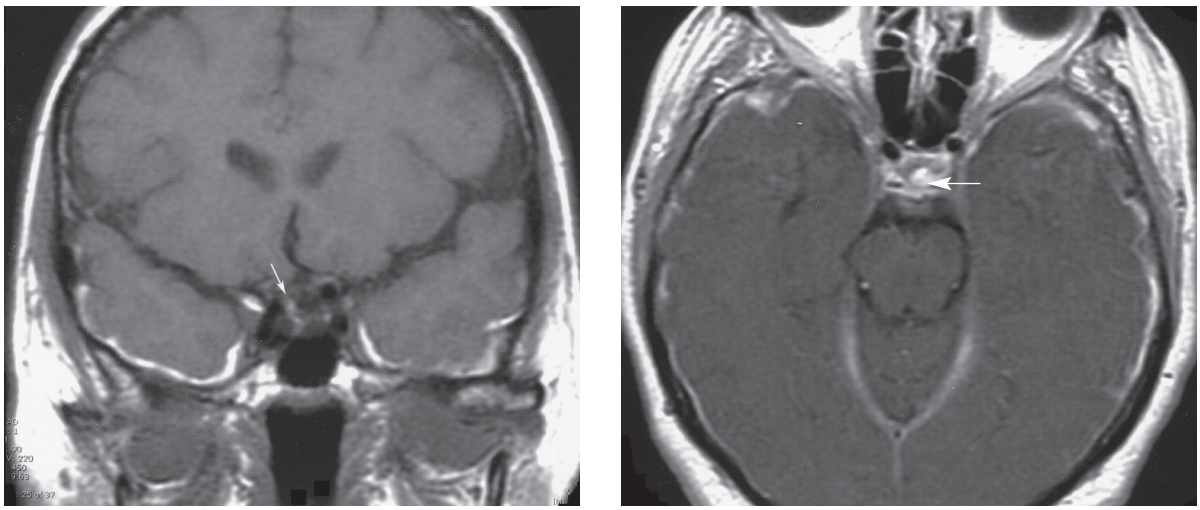

Figure 1 MR images of pure subdural haemorrhage and intrasellar superior hypophyseal artery aneurysm. A) Coronal view T1-weighted image shows subacute blood products (dilute methemoglobin) in the subdural space beneath temporal lobes, flow-void of the dome of a left superior hypophyseal artery aneurysm projecting into the sella turcica, and a small amount of blood adjacent to right side of the dome (arrow). B) Axial view contrast-enhanced T1-weighted image shows enhancement of the aneurysm within the pituitary fossa (arrow).

Skull radiographs and post-embolization CT scans showed the coils to be at the top of the pituitary fossa (figure 4). The patient was discharged home after an uneventful postoperative course. Six months after treatment, the patient is symptom free. Repeat angiography revealed obliteration of the aneurysm with only a minimal neck remnant (5%).

Discussion

Pure Subdural Haemorrhage from Aneurysmal Rupture

Acute subdural haemorrhage after aneurysmal rupture has been reported in up to 8% of patients presenting with SAH [1] and may be as high as 20% in autopsy series [3]. Pure subdural haemorrhage due to a ruptured intracranial aneurysm, however, is less common, with sparse reports in the literature. The condition was found in only 3% of a large autopsy series [3]. When associated with subdural haemorrhage, aneurysmal rupture also carries an increased risk of poor outcome as compared to bleeding confined to the subarachnoid space [4]. Several mechanisms have been proposed for the formation of a pure subdural haematoma after aneurysmal rupture [1]. Small haemorrhages may cause the dome of the aneurysm to adhere to the arachnoid membrane, while a final, high pressure rupture causes a tear in the adherent arachnoid with extravasation into the subdural space. Similarly, the haemorrhage point of the aneurysm may be located at a site where the arachnoid is held in close proximity to the dura mater, most commonly at the falx cerebri or the plica petroclinoidea, allowing for tearing of the arachnoid and subdural haemorrhage. Alternatively, the haemorrhage site of an aneurysm may be located in an anatomical site that is extra-arachnoidal, yet intradural, such as at the dural collar of the clinoidal carotid artery or the superior hypophyseal artery within the sella turcica.

A review of the literature revealed 25 surgical cases of pure subdural haematoma [1,2,4-9]. In these cases, SAH was ruled out by lumbar puncture or surgical inspection. Most of the pure subdural haemorrhages were caused by aneurysms of the ICA, associated with the posterior communicating artery (13 of 22 with reported location). Other sites of aneurysms producing pure subdural haematoma included the anterior cerebral artery (including the communicating segment) in five patients, the middle cerebral artery in three patients, and the intracavernous carotid artery in one patient. In an autopsy series, five of six pure subdural haemorrhages arose from a ruptured anterior communicating artery [3]. To our knowledge, ours is the first reported case of a superior hypophyseal artery aneurysm presenting with pure subdural haemorrhage.

Anatomical Considerations

Carotid artery aneurysms arising between the distal dural ring and the posterior communicating artery have been classified as paraclinoid aneurysms [10]. Most of these aneurysms arise at the origin of the branching arteries of this segment: the ophthalmic and superior hypophyseal arteries. The superior hypophyseal artery is not a single artery, but rather a group of one to three small arteries with an average diameter of 0.22 mm arising from the medial aspect of the paraclinoid internal cerebral artery [11]. The artery courses posterosuperiorly and medially from the carotid artery, toward the pituitary stalk before dividing. The branches may terminate on the stalk, supply the inferior optic chiasm, or run along the stalk through the diaphragma sellae. Aneurysms arising at the origin of this vessel are usually oriented superomedially or inferomedially (suprasellar and paraclinoid variants, respectively) [12]. The suprasellar variant extends medially over the diaphragma sellae, while the paraclinoid variant projects inferomedially beneath the anterior clinoid process. Rupture of a paraclinoid aneurysm typically presents with SAH and often with visual field changes (up to 18%) [12].

The aneurysm in our patient arose from the inferior aspect of the paraclinoid ICA and projected medially over the diaphragma sellae. Its bilobed morphology was likely the result of a "waist" caused by constriction of the aneurysm by the diaphragma sellae around the pituitary stalk (figure 2B,C). This patient presented with a pure subdural haemorrhage that was located within the sella turcica, layered along the cranial base, and into the posterior fossa (figure 1). To achieve this bleeding pattern without subarachnoid blood, the aneurysm must have ruptured within the pituitary fossa, where the superior hypophyseal artery is extra-arachnoidal but within the subdural space.

Implications for Management

An aneurysm that ruptures into the subdural space often presents the treating physician with diagnostic and therapeutic problems. These haemorrhages may present with the signs and symptoms of a SAH or of a mass lesion causing significant mass effect on radiographic imaging. Emergent evacuation of the haematoma may be necessary. Therefore, those spontaneous subdural haemorrhages with a history sugges-

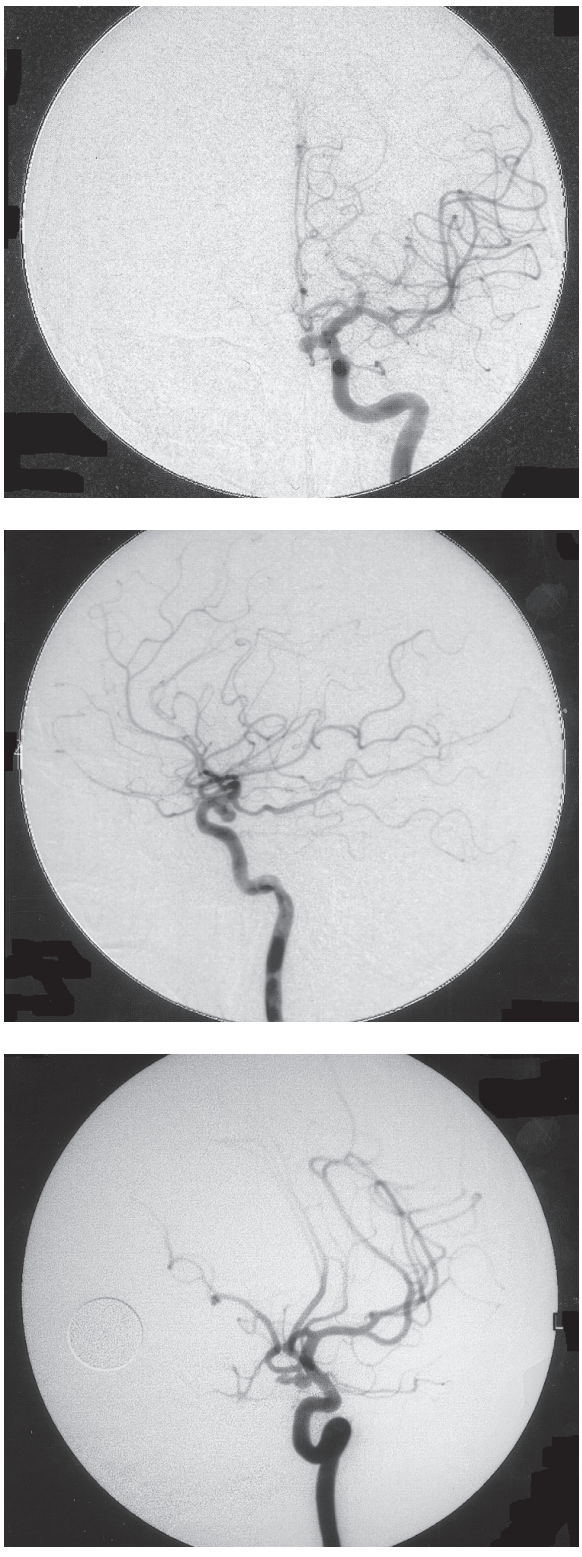

Figure 2 Angiograms of the left ICA. A) AP, B) lateral, and C) oblique views reveal bilobed superior hypophyseal artery aneurysm projecting posteriorly and medially from the ICA distal to the origin of the ophthalmic artery.

Figure 3 Post-embolization angiogram of the left ICA. APRPO view demonstrates dense packing of the aneurysm with faint opacification of the aneurysm neck and no filling of the aneurysm dome (arrow).

tive of SAH or retinal haemorrhage should be investigated with an angiographic technique (conventional catheter cerebral angiography, CT angiography, or MR angiography) before surgical intervention. If an aneurysm is found, it can be treated appropriately. Our patient complained only of a headache and visual disturbances (Hunt and Hess grade I), and did not require evacuation of the subdural haematoma. Patients not requiring emergent craniotomy should be treated with prompt surgical or endovascular treatment of the aneurysm. In our case, the aneurysm had a narrow neck and long fundus, making it ideal for coil embolization.

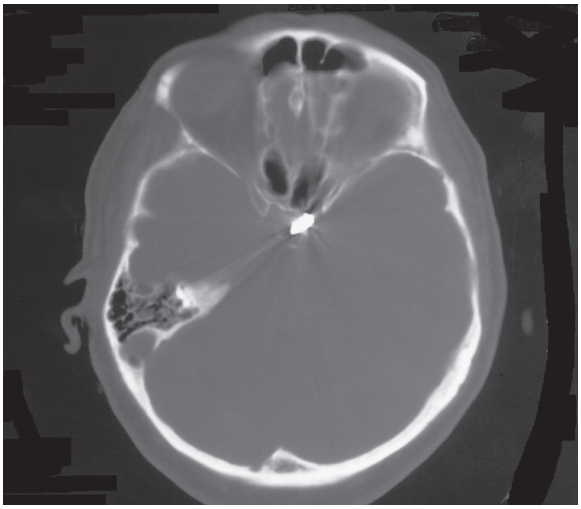

Figure 4 Axial CT bone window image through the top of the sella turcica shows coil mass.

Conclusions

Spontaneous subdural haemorrhage can present both diagnostic and therapeutic problems. An aneurysmal source must be investigated in spontaneous subdural haemorrhages. Those haemorrhages presenting with life-threatening mass lesions should be treated surgically, while those of lower grade have more diagnostic and treatment options, including endovascular coiling as well as surgical clipping. An unusual radiographic pattern of haematoma or associated retinal haemorrhages should alert the treating physician to suspect a ruptured aneurysm.

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